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Original communication

The case for a cost-effective central coronial database following an analysis of coronial records relating to deaths in nursing homes

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ABSTRACT

In order to demonstrate the potential wider epidemiological application of the data held in coroners' files, this paper uses an analysis of nursing home deaths reported to the coroner in County Kildare, Ireland. We examine the deaths in relation to ages, primary causes of death and rates of post-mortem examination. Knowing that Europe's population is increasing in age, the analyses presented here show the type of information that could be made available relating to certain population cohorts. Currently, there is no easily accessible way to obtain this information in Ireland, so we present the case for the implementation of a central coroner's database with potential for application in other jurisdictions but with the caveat that it must be cost-effective and use current resources, rather than establishing new ones.

1. Introduction

This paper uses data about a particular sub-set of deaths (occurring in 2005–2011) from one coronial jurisdiction in Ireland, that of County Kildare. These data are examined to ensure forensic and medico-legal oversight of deaths in a vulnerable population. It is proposed that data generated by coroners should be collated nationally and made available for research and analysis.

No study has been carried out to date that analyses deaths in nursing homes reported to coroners in Ireland. A nursing home is an institution (usually private) that provides long-term residential accommodation for the elderly. Extracting data analyses from coronial files, this study illustrates what could be achieved, on a national basis, were the information more readily accessible. Ireland, with a total population of approximately 4.5 million,[1] has an ageing population and it is estimated that by 2021, older females will total 15.8% of the population and older males will be 14.1%.[2] Public health epidemiology would be enhanced by knowing what medical cause and in what circumstances, the increasingly elderly population is dying.

Currently there are approximately 613 registered nursing homes in Ireland[3,4] catering for approximately 21,000 individuals aged 65 and over.[5] Since 2008 all nursing homes have been subject to a standard set of statutory regulations and guidelines.[6,7] Since 2005 nursing homes are obliged to report a death of a resident to the coroner.

2. Aims

The aim of this article is to examine nursing home deaths in one coronial jurisdiction, that of County Kildare. There is currently no central or national database where this information can be accessed and shared between coroners and researchers. It is difficult to conduct any sort of nationwide analysis of morbidity and mortality of deaths under coronial investigation. Therefore, this article has another aim – to show that the information collected by coroners is an essential part of any epidemiological study and that it should be made available publically through anonymised databases. A forensic and medico-legal death investigation database, with accessible data, should be readily available in all countries, especially countries that have yet to initiate such a project. Resources to fund such a database are scarce. This article presents a case for a cost-effective use of existing resources.

3. Background and procedures

This study examines the nursing home deaths between April 2005 to June 2011. In County Kildare, there are 23 nursing homes and, since 2005, all nursing home managers must report the death

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of a resident to the coroner and this arrangement was formalised in 2006.[8,7] In 2004, the Shipman Inquiry in the UK first highlighted the importance of accurately recording deaths in the elderly population. In that Inquiry, the practice of coroners accepting "old age" as a cause of death was thoroughly examined and it was stated that:

> Under the current system, it is open to a doctor to certify the cause of death just as 'old age'. The guidance provided to doctors completing an MCCD [medical certificate of cause of death] states that 'old age' should not be used as the only cause of death, unless a more specific cause of death cannot be given and the deceased was aged 70 or over.[9]

In Ireland, under the Civil Registration Act, 2004, the Death Notification Form (which doctors complete) is accompanied by "Notes and Suggestions regarding certification of causes of death" with an accompanying list of "Indefinite or Undesirable terms". "Old age or senility" is listed and doctors are directed that further information is required, such as the disease causing death. "Old age" is not accepted as a cause of death. The Coroner's Bill 2007, sections 25 & 26[10], provides a single statutory basis for the obligatory reporting of such deaths to the coroner. However, this Bill has not yet been enacted.

The introduction and maximising the use of information technology was deemed to be one of the critical long-term goals of the 2000 *Review of the Coroner Service* (see p. 91 of that Review), which made 105 recommendations. Another recommendation in that Review was the introduction of a coroner's officer who would have a wide range of duties including "managing the information systems of the coroner's office, including the application of information technology and interfacing to national systems of coroner information".[11] 13 years later and neither of these recommendations have been introduced in part due to financial constraints. Given the advances in information technology over the past decade, it is time to address the use of coroner's data slightly differently.

A specific case database for the coroner's system might not be the best, or most cost-effective, approach. Currently there are a number of different databases in the country that classify various types of death but perhaps the closest system to a database of coronial records would be the one run by Health Research Board for the National Drug-Related Deaths Index (NDRDI). Specialist NDRDI researchers visit each coronial jurisdiction, review the files manually, and record all drug and alcohol related deaths.

Coroners are in a unique position to provide information about the types of death that occur within their respective jurisdictions. Currently, there is no means of obtaining these data unless each coroner's jurisdiction is visited and the data analysed separately, like the process used by the NDRDI researchers. Other researchers such and Hasleton have stated the importance of this use of data:

> Both the Fundamental Review and the Shipman Inquiry recommended a more robust approach to death prevention and more effective use of the data the systems acquire. Therefore, medical examiners could be responsible for keeping a database of deaths in their locality to support public health initiatives and thereby strengthen the understanding of the pattern of deaths.[12]

The impact that the Shipman Inquiry has had on coronial systems is of great importance. In light of what happened with Shipman, the coroner in Kildare asks a series of questions when a death in a nursing home is reported. This ensures that the death investigative process does not rely on the assessment of only one professional. The coroner will ascertain how long the person has been resident in the nursing home and what is the status of any medical conditions (like pressure sores, for example), or has the person been in hospital recently. It will also be verified if the person has seen a general practitioner recently. The coroner will also query as to whether the person has suffered any falls, has a healthcare acquired infection or whether the staff have any issues that they might like to raise. The coroner will also ask if the family have raised any queries or concerns and the coroner will also speak to the attending physician who completes the medical certificate for the cause of death.

When the corner has confirmed the issuing of the medical cause of death certificate by the attending doctor, the coroner will then forward the coroner's certificate to the Registrar of Deaths, thus ensuring an oversight system.

4. History of databases and coronial records

The establishment and use of centralised databases, especially those that use coroners/medical examiner records, began in America in the 1980s. Hanlick & Parrish showed that databases which use medical examiner and coroner records proved to be invaluable resources for public health concerns, identifying high-risk groups of people and establishing main causes of death.[13]

In 1994, the National Association of Medical Examiners (N.A.M.E.) conducted a survey to evaluate the current computerisation status of medical examiner records in America.[14] That study stated that as a result of measures to encourage medical examiners and coroners to keep electronic records of their data, considerable electronic death investigation data exist that can provide timely and valuable information for mortality and public health studies. The authors found that a typical computerised medical examiner office would typically have around 1000–6000 death reports per year. Such an office would keep electronic records on all cases reported and would have data on cause of death, manner of death, how injuries occur, and toxicology results.[14]

In this current study the coroner's files were analysed using Excel.

5. Results and analysis

Once all the data had been inputted for the seven-year period under review, it was established that 1180 deaths from 23 nursing homes were reported to the coroner. This is a substantial number of deaths and further highlights the reasons for nursing home deaths to be reported. The vast majority of deaths in nursing homes that occurred were in the over 60 age group. There were 20 deaths that occurred below this age with two dying at the age of 33 and 35 (but these residents had Huntington's chorea and Adrenoleukodystrophy respectively) (Fig. 1).

The numbers of deaths in nursing homes and the number of subsequent post mortems were analysed. Only 10% of all post mortems were carried out on people who died in a nursing home although nursing home deaths accounted for 45% of the total deaths reported to the coroner. There has been an increase in reports to the coroner since it became policy to report nursing home deaths but this has not led to a significant increase in post mortem work or to any noticeable increase in inquests held. An inquest into a death in a nursing home is rare and of the 1180 cases under review, it was necessary to hold an inquest into one death only (although this number has increased since the study period ended in 2011). Nursing home deaths in Kildare show a higher post mortem rate compared to an American study carried out by Gruzsecki et al. which showed an autopsy rate of less than 1% in nursing home residents.[15] That study also found that deceased persons are far less likely to have an autopsy if in a nursing home resident than if they die in the community. An 85-year-old man is

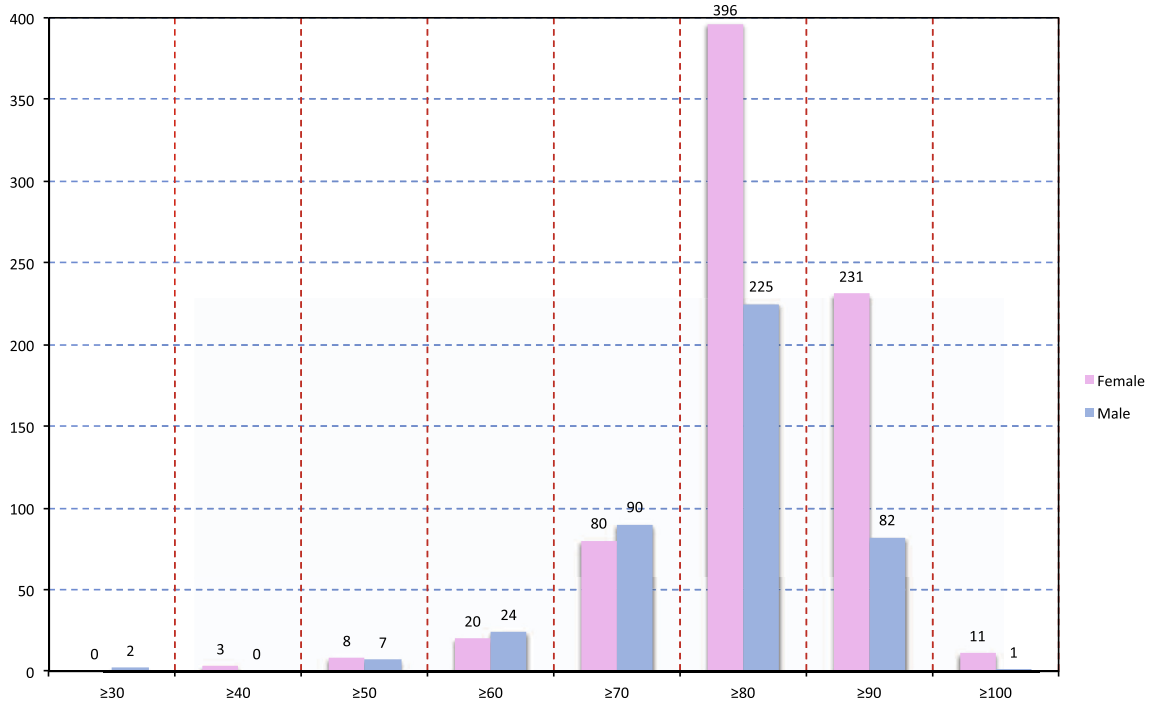

Fig. 1. Ages of people who died in nursing homes.

approximately 10 times less likely to undergo autopsy when dying outside a nursing home than when dying within a nursing home.

The post mortem rate evidenced in our study should ensure that no unnatural deaths are missed (or concealed). However, it must be pointed out that in nursing homes, where residents are often old and unwell, death is more likely due to natural causes and a post mortem rate that would be as high as the normal rate would not be expected, cost-effective or beneficial (Fig. 2).

The cause of death was also analysed. It is recognised the cause of death may be inaccurately attributed in the first instance. Roulston et al. showed that the discrepancies between cause of death on death certificates after clinical diagnosis and post mortem findings ranged from 30 to 63% with a mean discrepancy rate for cause of death as 45.5%.[16] Other studies have also found major discrepancies in the cause of death between the death certificate and evidence from examination of the medical records[17] or from hospital post

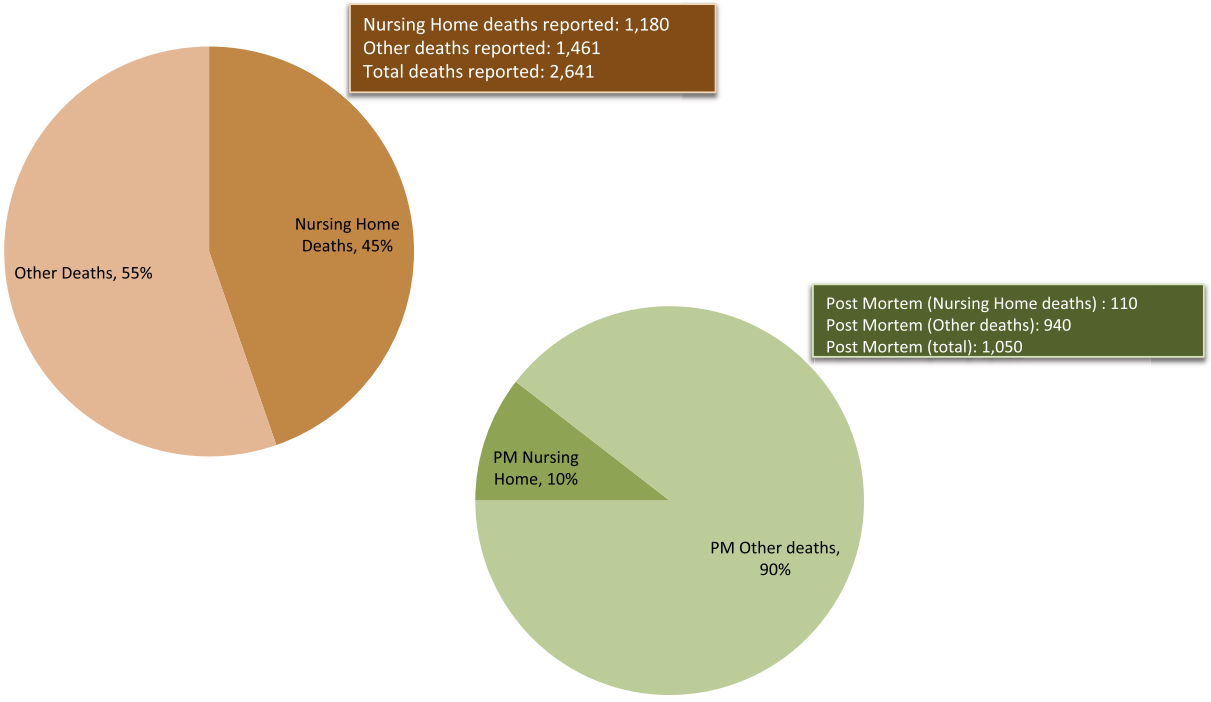

Fig. 2. Nursing homes deaths versus other reported deaths.

mortem.[18] Therefore with such discrepancies the true cause of death may be inaccurate notwithstanding direct coronial inquiry and clinical opinion and this is a limitation of this study as post mortem examinations were carried out on a small percentage of the nursing home deaths in this seven year period.

It should be noted that "old age" is not accepted as a primary cause of death in Ireland and in this study, neither was Alzheimer's/vascular dementia *per se*. Typically, such degenerative conditions are generally not accepted as the immediate and acute cause of death. Therefore, only the primary and acute cause of death was analysed and it is acknowledged that many of these people were suffering from either Alzheimer's/vascular dementia or from "old age", perhaps as a secondary cause of death. Only the disease or condition directly leading to the death is analysed here and the antecedent causes of death are not analysed in this study (Fig. 3).

A review by Muder stated that pneumonia is the leading cause of death in patients in long term care facilities including nursing home residents and suggests that the number of cases of pneumonia will only increase.[19] Other historical have studies found that pneumonia was the cause of one third to one half of all deaths[20,21] and yet more report that 26%–44% of deaths are related to pneumonia.[22–24] It would seem that most people with Alzheimer's will have their cause of death recorded as pneumonia[25] (as the terminal cause of death) and this study supports those findings.

6. Conclusions

The reporting of deaths in nursing homes to the coroner has ensured coronial oversight of causes of death, it has not had the subsequent consequence of increasing the numbers of inquests. While there may be some extra post mortems, it is not a significant number and these post mortems are necessary to establish a cause of death where a medical practitioner is not satisfied to certify a medical cause of death. Furthermore, the reason for the low post mortem rate in nursing home deaths is due to the old and often unwell residents who are often known to doctors and natural causes are more readily deduced.

Medical examiner/coroners offices have databases that contain valuable information but that they also require information input; a database does not appear fully-formed without the information it needs. Data analysis follows data input and it is perhaps here, in data *analysis*, that coroners in Ireland, and forensic or medico-legal death investigators elsewhere, should focus attention. It is now proposed and recommended that a centralised database should be compiled. Such a database would provide information which has been previously unobtainable (or, at least, difficult to obtain). If a coroner is familiar with his or her manual system then this should continue, but it should run concurrently with a new computerised central database.

Furthermore, and perhaps most crucially, it is recommended that as projects such as the NDRDI that already visit each coronial jurisdiction to compile data on alcohol and drug related deaths, that such a project be expanded to include all deaths. No specialised database needs to be established and the accompanying cost and time spent in training coroners (and their associated staff) would not arise. When resources are scarce, the best use of existing resources must be looked at. Availability of coroner's data to other interested agencies benefits the wider healthcare system with the information gathered. Such a system may also have wider application to other jurisdictions in forensic and medico-legal death investigation.

The data analysed in this paper give some insight into the effect of the compulsory reporting of nursing home deaths. It is currently not possible to obtain these data for all of Ireland but it may be in the future. If a database like the NDRDI were expanded, then the duplication of resources would not occur and the relevant information would be collected in a consistent fashion. This study does not find anything of particular alarm or concern in the causes or manner of deaths analysed but what is does show is that no death should happen without a proper investigation or without some questions being asked. This is the first comprehensive study of

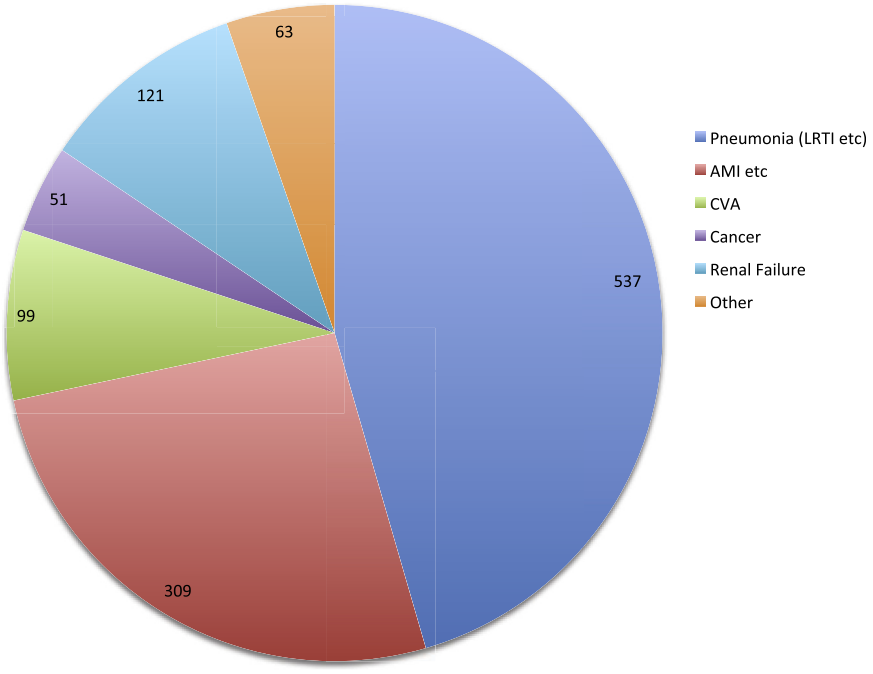

Fig. 3. Causes of death in nursing homes.

deaths in nursing homes in Ireland and is a project that should be expanded and continuously monitored.

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None declared.

Ethical approval

Ethical approval was not required because data were collected on deceased persons by the coroner's service in accordance with law for the purpose *inter alia* of collation and public record. All data were nonetheless anonymised notwithstanding individual cause of death and mode of death data being available on the public record. Data protection requirements were met.

Conflict of interest

The authors declare that we have no conflict of interest.

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